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Changes in the Cyclical Behavior of Interest Rates

Phillip Cagan

INTRODUCTION

Along with growth in size and complexity of the financial system over the past century, changes have occurred in the cyclical behavior of interest rates. This paper describes changes in the behavior of a broad group of rates. The long-term interest rates covered are yields on U.S. bonds and high and low grade corporate bonds for the period since World War I, and yields on high grade corporate, municipal, and railroad bonds for a longer period. The short-term series are rates on Treasury certificates and bills, acceptances, bank loans, and discounts, which cover the period since World War I, and rates on call money and prime commercial paper for a much longer period. These are the main monthly and quarterly data available for an extended period. Annual series are less reliable for examining cyclical behavior, and were not used.

NOTE: This paper was originally printed as NBER Occasional Paper 100, 1966, which was reprinted from the August 1966 issue of *Review of Economics and Statistics*.

I wish to acknowledge the suggestions of the late William H. Brown, Jr., the late Joseph W. Conard, Milton Friedman, Jack M. Guttentag, F. Thomas Juster, Allan H. Meltzer, Geoffrey H. Moore, the late Sophie Sakowitz, and members of the advisory committee for the interest rate project. Thanks are due also to Lester V. Chandler, Joseph H. Willits, and Theodore O. Yntema of the National Bureau Board of Director's reading committee.

I am grateful to Josephine Trubek, who assisted in the statistical computations; to James F. McRee, Jr., for editorial help; and to H. Irving Forman for the charts.

An obvious problem in working with interest rate data is that institutional developments have altered the character of the markets and the financial instruments from which the series are derived, making it difficult to distinguish between changes affecting particular rates and changes of broader significance. No series with long coverage exists for which the financial instrument has not changed substantially in quality or function. For example, no instrument of earlier periods quite compares to the role of Treasury bills in the post-World War II money market. Series are available for a long period on call money and commercial paper, but these instruments do not have the same characteristics they used to.¹ Some series for long-term bonds are fairly comparable over a long period, but they are compiled from a changing list of securities over time (to maintain roughly the same average term to maturity) and are subject to the inaccuracies of a changing composition.² It should be kept in mind, therefore, that the changing character and possible inaccuracies of these series affect their cyclical timing and amplitude of fluctuation to some extent, particularly over long periods of time. Yet there is no need for undue pessimism; interest rates are largely free of many difficulties inherent in measuring expenditure and income streams or stocks of wealth. The rates need no adjustment for changes in the value of money or in the unit of measurement, and reporting errors appear comparatively small. For business cycle research, interest rates rank among our more reliable and useful time series and provide a body of evidence on cycles that can hardly be ignored.

The dates of cyclical turning points in the series, seasonally adjusted,³

¹ Richard T. Selden, *Trends and Cycles in the Commercial Paper Market*, Occasional Paper 85, New York, NBER, 1963.

² See the discussion in F. R. Macaulay, *The Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, New York, NBER, 1938, Chap. III.

³ The adjustments for the post-World War II period were done by the late William H. Brown, Jr., as part of the NBER interest rate project.

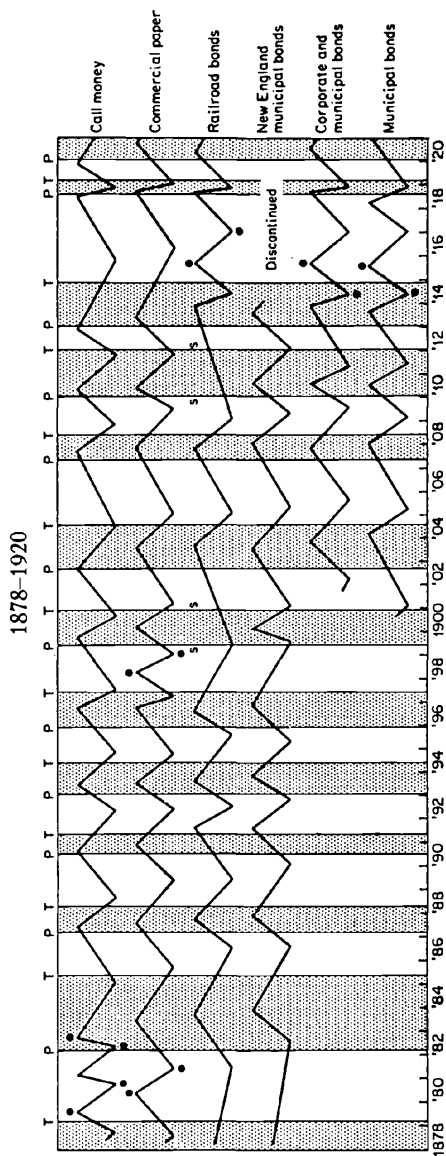
The dates of some turning points in Appendix Table 1-A for the post-World War II period differ from those presented for the same series by Thomas E. Holland ("Cyclical Movements of Interest Rates, 1948-61," *Journal of Business*, Oct. 1964, pp. 364-369). His seasonal adjustment may differ slightly (the Shiskin-Eisenpress computer program, also used here, allows certain options), but the main differences probably reflect Holland's decision to remove "irregular movements" (by a moving average) before dating the turning points. A moving average can shift the date of turning points and was not used in deriving Appendix Table 1-A.

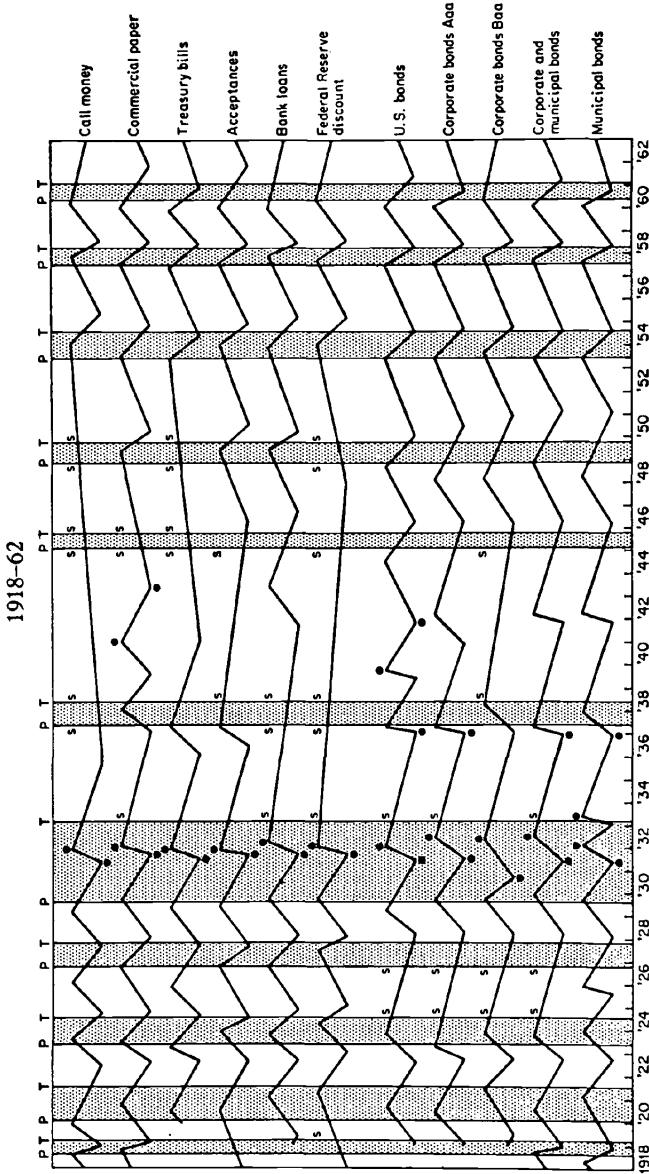
are listed in Appendix Table 1-A and shown graphically in Chart 1-1. The series referred to as Treasury bills is based on Treasury notes and certificates to 1929 and three-month bills thereafter. The dates of the 1919 trough shown for U.S. bonds and corporate bonds Aaa appear correct but might be too late by a few months, since the series begin in that year and an earlier turn cannot be ruled out for certain. For comparison with peaks and troughs in general business activity, the chart shades periods of business contraction.⁴ Cyclical movements in the rates that do not correspond to reference cycles, and reference phases skipped by the rates, are noted on the chart. Many such discrepancies occurred, but on the whole all the rates usually conform well to business activity, as has long been recognized. Many of the discrepancies pertain to the 1930-49 period. Financial disorders produced extra cycles in rates in the early 1930's; then, with depressed business activity and rapid growth in the money stock during the second half of the 1930's, interest rates declined steeply and did not respond in the usual way to the business cycle. During and after World War II the Federal Reserve pegged U.S. bond and bill yields, indirectly affecting all interest rates, which explains skipped cycles during the 1940's. Aside from these episodes, the only other discrepancy from 1919 to 1961 was the 1924-26 reference expansion skipped by most bond yields, reflecting prolonged declines from the high levels attained in 1920. Between 1878 and 1913 there were few discrepancies. Beginning the analysis with 1878 avoids atypical behavior in the 1870's, when most series had extra cycles during the 1873-79 business depression; in that respect the decade resembles the 1930's.

Since 1953 the rates covered by Chart 1-1 have conformed to every reference phase, which some commentators take as indication of a fundamental change in the money market. Important changes have occurred, to be sure, but the conformity does not appear exceptional. Call money and commercial paper rates had nearly perfect conformity to the ten reference cycles from 1885 to 1919. The chief discrepancies are associated with special disturbances in the money market. After all, price and output series, most of which conform closely to general business activity, also undergo unusual movements when subject to special developments such as strikes and wartime controls. Yet there is a clear difference: Interest rates appear to reflect special influences

⁴ For the dates, see Geoffrey H. Moore (ed.), *Business Cycle Indicators*, Princeton for NBER, 1961, Vol. I, p. 670. The latest reference trough is February 1961.

CHART 1-1. Chronology of Specific Cycles in Interest Rates Compared With Reference Cycles





NOTE: shaded areas represent reference cycle contractions; white areas, expansions.
 SOURCE: Appendix Table 1-A. Municipal bonds are Standard & Poor's series through the 1930's and Moody's Aaa series thereafter.
 • denotes turns not matched with reference cycles.
 s denotes reference turns skipped.

ber and a trough in July. During the 1957-59 period, it constituted

more often than price and output series do, and each time for a longer period. The highly volatile behavior of financial markets is well known and needs no documentation here.

For present purposes it appears more fruitful to confine the analysis to the typical behavior of interest rates. Most of the analysis therefore excludes the 1930's and 1940's, World War I, and the post-Civil War period to 1878. That leaves the period since 1953 to compare with the 1920's, and these two decades to compare with the four and a half decades between 1878 and 1914.

Chart 1-2 shows the cyclical behavior of interest rates on a reference cycle basis. The patterns suggest two tendencies to be examined in detail: a shift toward earlier turning points in relation to reference turns and a greater amplitude of fluctuation in the 1950's than earlier.

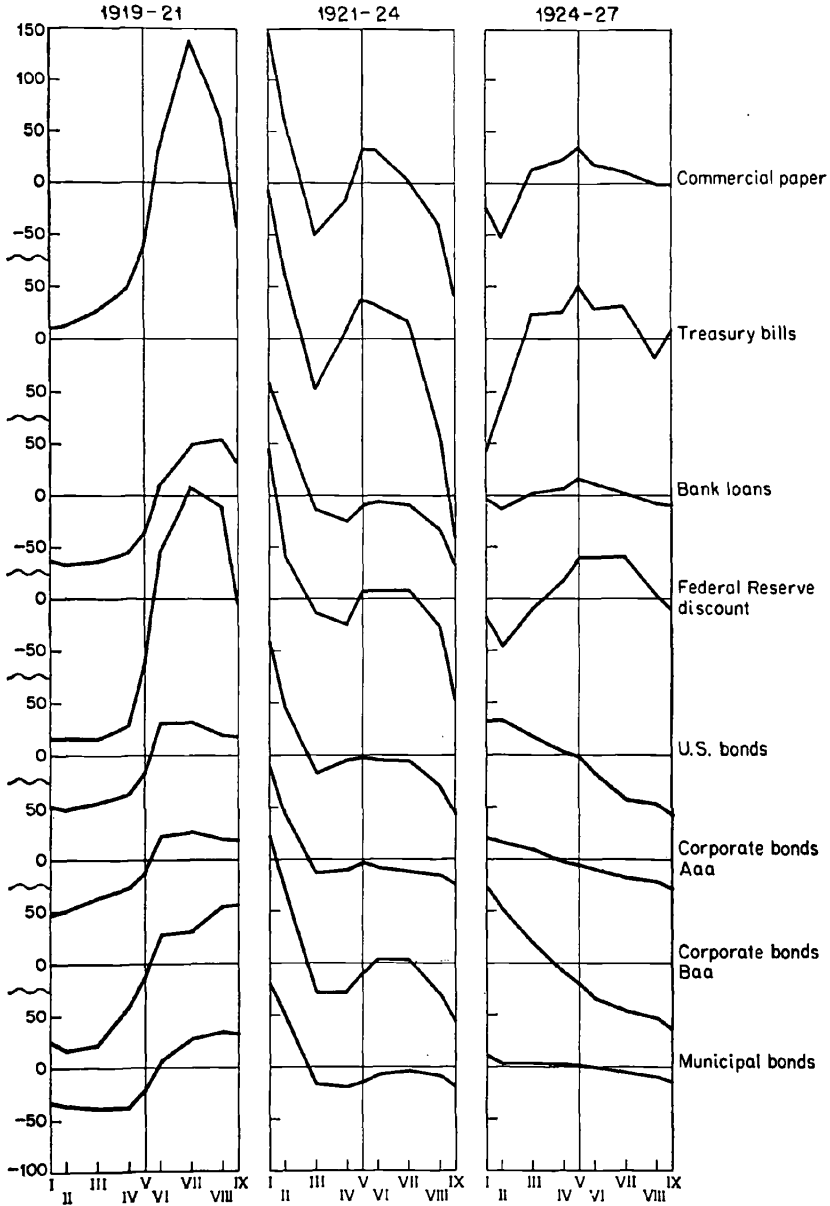
TIMING

The generally lagged timing of interest rates at reference turns, evident in Chart 1-1, is summarized by Table 1-1, which gives the median lag of each rate in selected periods. The table covers the 1920's and 1950's (excluding World War I and the period from 1930 to the post-World War II unpegging of long-term rates in 1951), and the period 1879 to 1913 divided at 1900. (The main reason for dividing at 1900 is that two long-term rates are first covered just before that year.) Extra turns in the rates not matching reference cycles are ignored. Also, reference turns which a series skips are excluded. A comparison of median lags for rates that cover a different number or set of turns can be misleading. The medians appear satisfactory, however, for bringing out the changes in timing of each rate over time.

The length of the average lag of long rates has clearly declined at peaks and troughs. Some decline occurred between each period, and by the 1950's the lag had disappeared and in many series gave way to short leads. For short rates the table suggests closer timing to reference peaks in the 1920's than before World War I, but no definite change thereafter, and at troughs apparently no change over all. The lag in timing of long behind short rates, apparent before World War I, has narrowed consistently over the years, so that by the 1950's it was no longer evident.

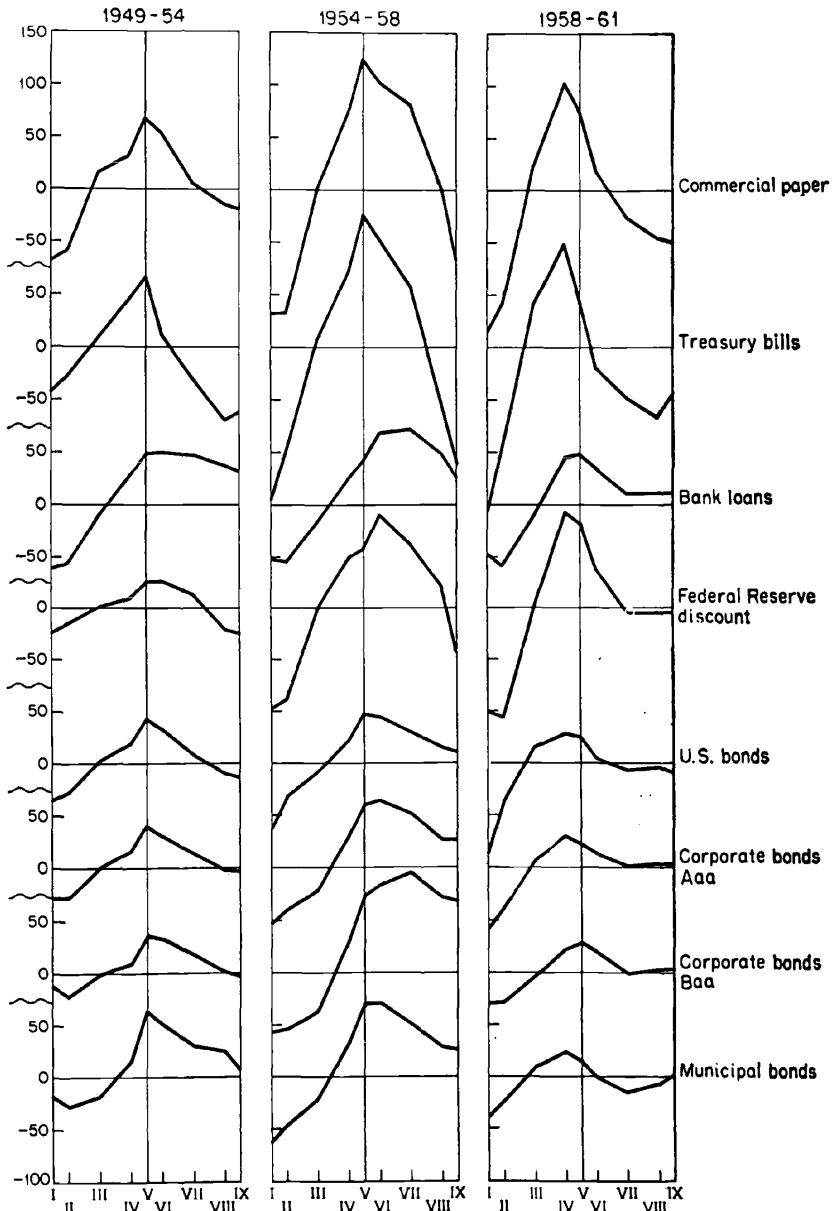
Timing among the series shows the active open-market rates generally turning first and the rates of thin or negotiated markets turning last. One indication of this pattern is that Treasury bills and U.S. bonds

CHART 1-2. Cyclical Patterns of Interest Rates, Nine Reference Cycle Stages (deviations from cycle averages, basis points)



(continued)

CHART 1-2 (concluded)



SOURCE: Same as for Appendix Table 1-B. Municipal bonds are Standard & Poor's series for 1919-27 and Moody's Aaa series for 1949-61.

TABLE 1-1. Median Lead (-) or Lag (+) of Interest Rates at Reference Cycle Turns, Selected Periods (months)

	Troughs					Peaks				
	Six: 1879-97	Four: 1900-12	Four: 1919-27	Three: 1954-61	Six: 1882-99	Four: 1902-13	Four: 1920-29	Three: 1953-60		
Short rates										
Call money	+2	-1	0	+7 ⁽¹⁾	+3	+2	-3	+5		
Commercial paper	+4	+4	+2	+4	+7	+6	+1	0		
Treasury bills	-	-	+1 ⁽¹⁾	-2	-	-	-2	-1		
Acceptances	-	-	0 ⁽¹⁾	+4	-	-	+2	+1		
Bank loans	-	-	+3	+4 ⁽¹⁾	-	-	+3	+5		
Federal Reserve discount	-	-	+12	+5 ⁽¹⁾	-	-	+10	+3		
Bond yields										
U.S.	-	-	+4 ⁽¹⁾	0	-	-	+5 ⁽¹⁾	-1		
Corporate Aaa	-	-	+5 ⁽¹⁾	+1	-	-	+1 ⁽¹⁾	-1		
Corporate Baa	-	-	+3 ⁽¹⁾	+2 ⁽¹⁾	-	-	+5 ⁽¹⁾	+2		
Corporate and municipal	-	+13	+4 ⁽¹⁾	+1	-	+9	+4 ⁽¹⁾	-1		
Municipal	-	+5	+3 ⁽¹⁾	0	-	+8	+7 ⁽¹⁾	-1		
Railroad	+14	+7 ⁽²⁾	+1 ⁽¹⁾	-	+8 ⁽¹⁾	+11 ⁽¹⁾	+4 ⁽¹⁾	-		
New England municipal	+20	+5	-	-	+10	+8	-	-		

NOTE: Numbers in parentheses give the number of reference turns missed or not covered by the series in the period. Calculation of the median sometimes gives numbers with the fraction $\frac{1}{2}$, such as a lag of $2\frac{1}{2}$ or $3\frac{1}{2}$ months; the $\frac{1}{2}$'s have been dropped in the table.

SOURCE: Appendix Table 1-A.

usually have the earliest turns, and bank loans and low grade corporate bonds the latest. The policy-determined Federal Reserve discount rate also turns late. The call money rate used to be consistent with this sequence by generally turning ahead of commercial paper rates, but it became a laggard after World War II. These differences in timing are all well known and, given certain institutional developments, they are to be expected, except perhaps for the discount rate, which could in theory lead all the other rates under certain policies but in fact lagged under the policies pursued.

The varied timing of the short rates points up the difficulty of comparing their behavior before and after World War I. The two short rates for the pre-1914 period differ in function from those available for the later period, and in addition have changed in character over the years. Call money rates are undoubtedly not the sensitive indicator of money market conditions today that they once were. There is some question also about comparing commercial paper rates today with earlier times.⁵ A comparison of short rates before and after World War I by means of these data, therefore, may be misleading. For the moment let us disregard this difficulty and summarize the behavior of the open-market short rates (that is, excluding bank loan and discount rates). If we suppress deviant behavior by taking the median lag of rates at each turn, Table 1-2 gives an arithmetic average of these medians for the earlier and later period, excluding the 1930's and 1940's. The lag of short rates at peaks declined significantly, but at troughs it increased (though not significantly). The latter increase appears exceptional, and if we exclude the 1921 depression, from which short rates recovered unusually late, the average lag at troughs for the later period drops to 2.1 months. That figure suggests, more plausibly, that the lag diminished slightly from the earlier period. The table also gives averages for all of the long rates. Their lag declined significantly at both peaks and troughs.

The large ranges of error for troughs in the right-hand column of Table 1-2 reflect large variations in timing between different reference troughs, but not exceptional variability between the rates at each turn. Turning points in the rates actually cluster relatively closer to each other at troughs than at peaks, as demonstrated by a measure of clustering in Table 1-3. The measure compares as a ratio the variation in the average lag of the rates among reference turns with the variation in lags among the rates. The ratio is significantly greater than unity in seven

⁵ See Selden, *op. cit.*

TABLE 1-2. *Arithmetic Average of Median Lags in Short and Long Rates at Selected Reference Peaks and Troughs Before and After World War I (months)*

	Period		Later Minus Earlier period
	1879-1913	1919-61	
Short rates			
Troughs	+2.7	+3.7	+1.0 (± 5.8)
Peaks	+4.7	+0.1	-4.6 (± 2.9)
Bond yields			
Troughs	+11.1	+2.7	-8.4 (± 7.7)
Peaks	+9.2	+1.1	-8.1 (± 2.7)

NOTE: Parentheses contain range of error at .05 level of significance based on the t distribution, which assumes the normal distribution of leads and lags about reference peaks and troughs. Coverage: Turns covered are the same as in Table 1-1 except for the inclusion here of the 1937 peak, and the exclusion of one trough and one peak for bond yields from the beginning of the earlier period (for 1879 and 1882). The excluded turns had very long lags which would make the medians for the earlier period even larger than they are. Rates covered are the same as Table 1-1 except for exclusion here of bank loan and discount rates and of railroad bond yields after World War I. Exact coverage is indicated in Appendix Table 1-A.

SOURCE: Appendix Table 1-A.

of the eight comparisons, indicating substantial clustering. In all cases turns in the rates cluster together more at troughs than at peaks and more in the later than in the earlier period. The two ratios for short rates in the later period would probably be even larger if we excluded the insensitive bank loan rate, not represented in the earlier period.

The one ratio less than unity (absence of clustering) among the eight comparisons—for short rates at peaks in the earlier period—indicates that turning points in call money and commercial paper rates then conformed less closely to each other than to reference turns. The call money market was highly sensitive to business conditions before the 1930's, producing close conformity of the rate to general business activity. The rate was related loosely to commercial paper rates and hardly at all to the long-term rates. In its affinity to business conditions, the call money rate before 1930 resembles the Treasury bill rate in the 1950's. If we link these two series in 1920 (when rates on short-term Treasury securities start) to form a single series representing the most sensitive short-term interest rate over the full period, a definite downtrend in the length of lag has occurred only at peaks (see Table

TABLE 1-3. *Degree of Clustering of Cyclical Turns in Short and Long Rates, as Indicated by Variation in Lags at Selected Reference Peaks and Troughs*

	F Ratios (and levels of significance): Variation Between Reference Cycle Turns as Multiple of Variation Around Each Turn	
	1879-1913	1919-61
Short rates		
Troughs	4.6 (.025)	10.7 (.005)
Peaks	0.27 (.05)	3.8 (.005)
Bond yields		
Troughs	9.4 (.005)	40.0 (.005)
Peaks	4.9 (.005)	7.0 (.005)

NOTE: Coverage is same as Table 1-2 except for the inclusion here of the bank loan rate. Method of computation: If L_{it} is the lag (in months) of i th interest rate at reference turn t , the F ratio is

$$\frac{\frac{T}{t} \frac{\sum (\bar{L}_t - \bar{L})^2}{T-1}}{\frac{T I}{t i} \frac{\sum \sum (\bar{L}_{it} - \bar{L}_t)^2}{I-T}}$$

where \bar{L}_t is the average lag of all rates at turn t and \bar{L} is average lag of all rates at all turns.

1-1). If instead we take commercial paper rates as the best single indicator of short rates over a long time span, that series also suggests that the lag at peaks shortened after World War I but remained substantially the same thereafter, and that the lag at troughs remained largely unchanged over all periods.

Secular trends in the rates can affect timing. A rising trend in rates might be expected to produce longer lags at reference peaks and shorter lags at troughs; and conversely for a falling trend. Table 1-4 tests this expectation for four periods which have fairly definite trends. Bond yields fell secularly from the mid-1870's to around 1900, rose subsequently to World War I, fell again during the 1920's and until after World War II, and then rose thereafter until 1960. The trend since then has been unclear. In Table 1-4 turning points near a change in direction of trend have been omitted. The table covers bond yields only; short-term rates have not displayed well-defined trends.

The relative timing at peaks and troughs is largely the reverse of the expectation. A comparison of periods, summarized in the right-hand

TABLE 1-4. Median Lead (-) or Lag (+) of Bond Yields at Reference Cycle Turns for Periods of Falling and Rising Trend (months)

Bond Yields	FALLING TREND (Expectation: short lags at peaks, long lags at troughs) ^a						RISING TREND (Expectation: long lags at peaks, short lags at troughs) ^a						COMPARISON OF PERIODS					
	1879-97		1919-29		1902-13		1953-60		Falling Trend		Rising Trend		Falling Trend		Rising Trend			
	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs	Peaks	Troughs		
U.S.	-	-	+5	+4	-	-	-1	0	-	-	-	-	-	1	1	1		
Corporate Aaa	-	-	+1	+5	-	-	-1	+1	-	-	-	-	-	1	1	1		
Corporate Baa	-	-	+5	+3	-	-	+2	+2	-	-	-	-	-	1	1	1		
Corporate and municipal	-	-	+4	+4	+9	+13	-1	+1	1	1	1	1	1	1	1	1		
Municipal	-	-	+7	+3	+8	+8	-1	0	1	1	1	1	1	1	1	1		
Railroad	+8	+14	+4	+1	+11	+7	-	-	2	1	-	-	-	-	-	-		
New England municipal	+11	+20	-	-	+8	+9	-	-	-	-	-	-	-	1	1	1		
<i>Total</i>									4	3	6	7						

NOTE: The fraction 1/2 has been dropped from the medians, as in Table 1-1.

SOURCE: Appendix Table 1-A.

^aExpected direction of shift in turning points resulting from trend.

columns, also suggests that trends play no part in the timing changes. While eleven of the twenty comparisons fit the expectation of shorter lags at peaks during falling trends and at troughs during rising trends, this is no more than would occur by chance. By contrast, nineteen of the twenty show a shorter lag in a later period. (Railroad bonds at peaks are the exception.)

The evidence therefore supports the following generalizations: (1) Interest rate fluctuations maintain a sequence, with the active open-market rates usually turning first and the rates of negotiated and inactive markets usually turning last. (2) All long rates used to but no longer lag far behind short rates. (3) The turns within the group of shorts, and within the group of long rates, occur fairly closely together, so that the variability of the lags within each group is much less than the variability of the average lag for the group between cycle turns. (4) Turning points have clustered closer to each other and closer to reference cycle turns over the years, though a shortening of the lag is more evident for longs than shorts, and for shorts more at peaks than at troughs. In recent cycles the vanguard of interest rates turns with, or sometimes even before, business activity as a whole.

So far as turning points are concerned, therefore, financial markets react more in unison with each other and closer to changes in business conditions than formerly. The next section brings out a similar development in amplitude of fluctuation.

AMPLITUDE

The amplitude of expansions and contractions provides, along with timing, a revealing measure of cyclical behavior. The cyclical amplitudes of the interest rate series, listed in Appendix Table 1-A, are summarized in Table 1-5 for the same four periods covered by Table 1-1, except that here the first period begins with 1885 for the shorts also, to omit some early cycles which do not match reference cycles. Unmatched cycles lessen the comparability of data between periods. With the coverage here, the only cyclical movement not matching a reference phase is the contraction in commercial paper rates, 1898-99.

Panel A gives per-month changes in the series from peak-to-trough stages of reference contractions and trough-to-peak stages of expansions, taking the negative of the algebraic change over reference contractions. Hence the measure can be, and sometimes is, negative, reflecting inverted cyclical movements. Panel A amplitudes are generally

larger for later periods. As in the timing comparisons, the main exception is the call money rate.

Much of the increase in amplitude appears to reflect the closer conformity in timing. Lags shift the specific cycles out of phase with reference cycles and reduce this measure of amplitude. A measure independent of timing, and therefore a better indicator solely of the amplitude of cyclical fluctuations, is the change for specific cycle phases shown in Panel B. To be comparable with A, Panel B excludes extra specific cycles not matching reference cycles. Also, the B averages incorporate a zero entry when the series skips a reference phase, so as to record the absence of any recognizable cyclical movement.

The specific cycle amplitudes are necessarily always positive and (barring an unusually large number of skipped phases, not a problem here) equal to or greater than the reference cycle amplitudes. Aside from that difference, Panel B does not show a clear difference in amplitude between periods. Among the short rates excepting call money, there is a slight increase from the 1920's to the 1950's; but call money and commercial paper had considerably larger fluctuations before 1900 than in the three periods since, which can be attributed only in part to the pre-1914 cycles with financial panics. Among bond yields, the evidence, though mixed for the later periods, shows a substantial increase from before to after World War I.

A comparison of amplitudes between periods can be influenced, however, by the severity of the reference cycles that each period happens to cover. The 1920's include the 1920-21 contraction, for example, which in severity far exceeds any contraction during the 1950's. To allow for differences in severity, Table 1-6 gives ratios of amplitudes for specific cycle phases in which the amplitudes of the corresponding reference cycle phases are approximately similar as judged by indexes of general business activity.

Well over half the ratios are above unity, indicating that fluctuations in rates, holding the severity of the corresponding reference phases approximately equal, were generally greater in the 1950's. The strongest exceptions are for call money and low grade corporate bonds, and for the short rates in column 4. Also, by these pairings, most rates had a comparatively greater amplitude in the two cycles after 1957 than in previous cycles. The largest increases are shown by commercial paper and Treasury bills and by high grade corporate and municipal bonds (again, the more active rates). The U.S. bond yield is an exception to the behavior of the active rates, perhaps because it already had a comparatively large amplitude in the 1920's (Table 1-5).

TABLE 1-5. Average Amplitude of Cyclical Phases for Selected Periods (basis points per month)

	1885-1900: 5 Expansions and 5 Contractions (1)	1900-13: 4 Expansions and 3 Contractions (2)	1919-29: 4 Expansions and 3 Contractions (3)	1953-61: 2 Expansions and 3 Contractions (4)
A. REFERENCE CYCLE PHASES				
Short rates				
Call money	15.5	13.9	15.5	5.7
Commercial paper	3.6	6.8	3.8	11.4
Treasury bills	-	-	6.0 ^a	12.4
Acceptances	-	-	5.6	11.3
Bank loans	-	-	0.9	2.7
Federal Reserve discount	-	-	3.0	7.3
Bond yields				
U.S.	-	-	0.8	3.8
Corporate Aaa	-	-	0.2	3.2
Corporate Baa	-	-	0.4	2.4
Corporate and municipal	-	-0.3	0.1	3.5
Municipal	-	-0.1	-0.4	3.4
Railroad	-0.5	0.0	-	-
New England municipal	-1.0	-	-	-
B. MATCHED SPECIFIC CYCLE PHASES				
Short rates				
Call money	31.1	27.9	19.5	7.3 ^b
Commercial paper	22.8	11.6	10.7	11.6
Treasury bills	-	-	11.3 ^c	14.5
Acceptances	-	-	11.9 ^c	12.4
Bank loans	-	-	4.7	5.4 ^b
Federal Reserve discount	-	-	8.3	9.4 ^b
Bond yields				
U.S.	-	-	3.3	3.8
Corporate Aaa	-	-	2.5	3.9
Corporate Baa	-	-	4.4	3.7 ^b
Corporate and municipal	-	1.6	2.2	4.2
Municipal	-	1.5	2.6	4.2
Railroad	1.4	0.9	2.2	-
New England municipal	1.8	1.8	-	-

NOTE: Method of computation: Algebraic change per month from trough-to-peak stages of expansions, plus negative of algebraic change per month from peak-to-trough stages of contractions, divided by number of phases. Inverted conformity to reference

(continued)

Tables 1-5 and 1-6 together give strong evidence of a large though not uniform rise in amplitudes. Bond yields had a doubling or more of amplitude from the 1880's to the 1950's. Increases occurred from before to after World War I as well as later. For short rates, on the other hand, an increase shows up clearly only from the 1920's to the 1950's.

Secular trends in interest rates do not account for these results. Amplitude is measured on a per-month basis, so a steady trend adds the same amount to each expansion and contraction. With contractions treated negatively, the trend cancels out over each cycle. Since the figures cover two expansions and three contractions in the 1950's, however, the upward trend in that decade on net makes our estimates of amplitude slightly too low. Such trend effects in the other periods are insignificant.

The similar behavior of municipal bond yields to the other series appears to deny an explanation based on the high marginal tax rate on corporate and personal income in the 1950's. It has been argued that the tax rate cuts the effectiveness of any given yield to both lenders and corporate borrowers. If corporations take advantage of the tax deductibility of interest costs and individual lenders attempt to avoid the tax on interest income (by seeking capital gains or nontaxable investment income), the level and amplitude of fluctuations in market yields might increase. There is evidence that investors now favor tax exempt municipal bonds and capital gain investments, probably for these reasons. But this cannot explain the increased amplitude of corporate (and taxable U.S.) bond yields from the 1920's to the 1950's, because municipal bond yields display roughly the same increase (Table 1-5).

NOTE TO TABLE 1-5 (concluded)

cycles, therefore, gives a negative amplitude over such cycles. The amplitude for specific cycles, of course, is always positive. If doubled, the figures give the average amplitude of a full cycle in the period.

In Panel B the amplitude is taken as zero when no specific cycle phase matches the reference phase. The only extra specific cycle in the periods covered was the contraction in commercial paper rates, 1898-99; it was suppressed by computing the change per month from one matching specific turn to the next. Skipped and extra cycles for each series are marked on Chart 1-1. Exact coverage is indicated in source.

SOURCE: Appendix Tables 1-A and 1-B.

^aFive phases only; first two phases not covered.

^bFour phases only; last contraction not covered.

^cSix phases only; first expansion not covered.

TABLE 1-6. Comparison Between Specific Cycle Phase Amplitudes for Which Severity of Corresponding Reference Cycle Phases Is Similar, Ratio of 1950's to 1920's

	Expansions				Contractions			
	1954-57 (1)	1958-60 (2)	1958-60 (3)	1953-54 (4)	1953-54 (5)	1957-58 (6)	1960-61 (7)	
Short rates								
Call money	.5	.6	.4	.1	.3	.5	-	
Commercial paper	.7	3.0	1.5	.6	2.8	1.6	3.1	
Treasury bills	.6	1.3	1.3	.9	3.0	1.5	3.8	
Acceptances	1.1	2.6	1.4	.2	.8	3.6	1.1	
Bank loans	1.4	4.5	1.0	.2	.9	1.7	-	
Federal Reserve discount	1.9	3.0	.8	.2	.4	1.0	-	
Bond yields								
U.S.	1.6	-	1.0	-	1.4 ^a	1.5	.9	
Corporate Aaa	2.0	-	2.8	-	2.6 ^a	3.4	3.2	
Corporate Baa	.9	-	.7	-	.8 ^a	1.1	-	
Corporate and municipal	2.2	-	2.5	-	3.2 ^a	4.7	2.5	
Municipal	2.5	1.1	1.6	2.7	4.2	3.7	5.6	

NOTE: Dates are for corresponding reference cycle phases.

SOURCE: Appendix Table 1-A. Paired cycles of similar severity in business activity are based on Geoffrey H. Moore, *Business Cycle Indicators*, Vol. II, pp. 104-5 and unpublished revisions.

^aAmplitude per month of the unbroken specific cycle contraction from 1923 to 1928 is used for both the 1923-24 and the 1926-27 contractions.

Although the evidence is based on a group of series which are not entirely comparable from period to period, the consensus of the measures is that, along with timing, the amplitude of cycles in most interest rates has responded more and more sharply to fluctuations in business activity of a given severity. The main qualifications involve the timing and amplitude of the two short rates before World War I, which cannot be appropriately compared with the series for the later period. Effects of financial disturbances in the 1930's and of interest rate pegs in the 1940's and early 1950's are wholly excluded from the comparisons. Amplitudes have been larger in the 1950's than the 1940's, of course, because the Federal Reserve pegged interest rates during and after World War II. Amplitudes would not be larger in the 1950's than the 1920's, however, unless monetary policy or other relevant factors differed between the two periods.

SUMMARY OF FINDINGS

Judged by the behavior of interest rates, financial markets have displayed increasing sensitivity to cyclical influences over the years. If the pre-World War I period, the 1920's, and the 1950's are compared, a broad group of rates has responded to moderate cycles in business activity sooner and with greater amplitude. The most dramatic change has occurred in bond yields: before World War I they typically lagged at business cycle peaks and troughs by many months, but they now display practically no lag, and over the same period the amplitude of their cycles appears to have doubled. Although trends in the cyclical behavior of short-term rates are less clear, some decline of the average lag also occurred, though mainly at peaks. These rates once turned long before bond yields, but have not done so in recent cycles.

APPENDIX TABLE 1-A. *Timing and Amplitude of Specific Cycles in Interest Rates, 1878-1961*

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
1. CALL MONEY RATE					
Sep. 1878	Aug. 1879	-6	-	38.0 ^a	-27.8 ^a
Oct. 1880	Feb. 1881	-	-13	133.5 ^a	-32.5 ^a
May 1882	Sep. 1882	-	-	56.9 ^a	-17.7 ^a
Jan. 1885	June 1887	-4	+3	20.4	-38.0
Aug. 1888	Aug. 1890	+4	+1	24.4	-28.0
May 1892	June 1893	+12	+5	37.3	-34.3
Nov. 1894	Oct. 1896	+5	+10	23.0	-50.4
July 1897	Oct. 1899	+1	+4	17.7	-37.1
Sep. 1900	Sep. 1902	-3	0	24.4	-31.0
July 1904	Oct. 1907	-1	+5	24.3	-72.8
Nov. 1908	May 1910	+5	+4	13.6	-9.5
Nov. 1911	Dec. 1912	-2	-1	19.5	-8.8 ^a
Nov. 1915	Aug. 1918	+11 ^a	0 ^a	13.3 ^a	-28.3 ^a
Dec. 1918	Nov. 1919	-3	-2	35.6	-16.0
June 1922	Aug. 1923	+11	+3	9.9	-24.2
Sep. 1924	Feb. 1926	+2	-8	16.1	-5.9
Sep. 1927	Mar. 1929	-2	-5	28.5	-28.0 ^a
May 1931	Dec. 1931	-	-	15.6 ^a	-5.3 ^a
Sep. 1935	Feb. 1954	+30 ^a	+7	1.4 ^a	-1.6
June 1955	Dec. 1957	+10	+5	5.0	-12.5
Aug. 1958	Apr. 1960	+4	-1	10.0	-
2. COMMERCIAL PAPER RATE					
Aug. 1878	May 1880	-7	-	7.0 ^a	-8.0 ^a
June 1881	June 1883	-	+15	6.6 ^a	-9.7 ^a
Sep. 1885	July 1887	+4	+4	12.6	-8.6
May 1889	Dec. 1890	+13	+5	9.0	-14.2
June 1892	July 1893	+13	+6	53.3	-52.2
Oct. 1894	Oct. 1896	+4	+10	16.1	-52.0
Apr. 1897	Apr. 1898	-2	-	12.5 ^b	-19.0 ^b
Jan. 1899	Mar. 1900	-	+9	11.8 ^b	-6.3
Mar. 1901	Aug. 1903	+3	+11	5.9	-12.0
Jan. 1905	Dec. 1907	+5	+7	8.2	-16.0
July 1909	June 1910	+13	+5	17.0	-9.6

(continued)

APPENDIX TABLE 1-A (continued)

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
Nov. 1911	June 1913	-2	+5	12.8	-8.7 ^a
May 1916	Oct. 1918	+17 ^a	+2 ^a	10.1 ^a	-21.6 ^a
Feb. 1919	Oct. 1920	-1	+9	14.4	-18.5
Aug. 1922	May 1923	+13	0	11.7	-12.2
Oct. 1924	Oct. 1926	+3	0	5.3	-2.5
Jan. 1928	Oct. 1929	+2	+2	10.4	-18.4 ^a
Sep. 1931	Jan. 1932	-	-	53.0 ^a	-5.3 ^a
Feb. 1937	Feb. 1938	+47 ^a	+9	2.2 ^a	-1.8 ^a
Aug. 1939	Jan. 1941	+14 ^a	-	0.7 ^a	-0.4 ^a
May 1943	June 1949	-	+7 ^a	1.1 ^a	-1.9 ^a
Apr. 1950	July 1953	+6 ^a	0	3.6 ^a	-7.1
Dec. 1954	Aug. 1957	+4	+1	8.3	-19.2
July 1958	Jan. 1960	+3	-4	15.7	-7.7
Nov. 1961		+9	-	-	-
3. TREASURY BILL RATE					
	June 1920	-	+5	-	-11.8
Aug. 1922	Mar. 1923	+13	-2	12.5	-14.1
Aug. 1924	Nov. 1925	+1	-11	12.4	-4.1
Sep. 1927	May 1929	-2	-3	13.0	-21.0 ^a
July 1931	Dec. 1931	-	-	43.0 ^a	-5.2 ^a
Feb. 1936	Apr. 1937	+35 ^a	-1	3.9 ^a	-1.4 ^a
Jan. 1941	June 1953	+31 ^a	-1	1.5 ^a	-12.5
June 1954	June 1957	-2	-1	7.7	-20.5
June 1958	Dec. 1959	+2	-5	16.3	-15.7
Dec. 1960		-2	-	-	-
4. BANKERS' ACCEPTANCE RATE					
	June 1920	-	+5	-	-12.6
Aug. 1922	Dec. 1923	+13	+7	7.1	-27.4
July 1924	Oct. 1926	0	0	6.2	-6.8
Sep. 1927	June 1929	-2	-2	11.3	-17.1 ^a
Sep. 1931	Nov. 1931	-	-	107.5 ^a	-9.3 ^a
June 1936	Apr. 1937	+39 ^a	-1	4.2 ^a	-0.1 ^a
Apr. 1946	June 1949	+6 ^a	+7 ^a	2.0 ^a	-1.0 ^a

(continued)

APPENDIX TABLE 1-A (continued)

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
July 1950	Jan. 1954	+9 ^a	+6	2.0 ^a	-5.7
Dec. 1954	Aug. 1957	+4	+1	7.8	-24.7
June 1958	Jan. 1960	+2	-4	16.1	-7.5
Nov. 1961		+9	-	-	-
5. BANK LOAN RATE					
May 1919	Feb. 1921	+2 ^a	+13 ^a	5.9	-8.9
Sep. 1922	Oct. 1923	+14 ^a	+5 ^a	2.8	-5.9
Nov. 1924	Oct. 1926	+4 ^a	0 ^a	1.4	-1.6
Feb. 1928	Oct. 1929	+3 ^a	+2 ^a	6.3	-6.8 ^a
Sep. 1931 ^c	Mar. 1932 ^c	-	-	-	-
Sep. 1941	June 1943	+39 ^a	-20 ^a	4.2 ^a	-2.1 ^a
Sep. 1946	June 1949	+11 ^a	+7 ^a	2.2 ^a	-1.2 ^a
Mar. 1950	Dec. 1953	+5 ^a	+5 ^a	2.5 ^a	-1.4
Mar. 1955	Dec. 1957	+7 ^a	+5 ^a	3.8	-9.9
June 1958	Dec. 1959	+2 ^a	-5 ^a	6.3	-
6. FEDERAL RESERVE DISCOUNT RATE					
Nov. 1917	Apr. 1921	+35 ^a	+15 ^a	7.9 ^a	-14.3
Jan. 1923	Apr. 1924	+18 ^a	+11 ^a	3.3	-16.7
Jan. 1925	July 1927	+6 ^a	+9 ^a	3.3	-8.3
Jan. 1928	Oct. 1929	+2 ^a	+2 ^a	11.9	-19.6 ^a
Sep. 1931	Jan. 1932	-	-	50.0 ^a	-1.3 ^a
Dec. 1947	Jan. 1954	+26 ^a	+6 ^a	1.4 ^a	-3.6
Mar. 1955	Oct. 1957	+7 ^a	+3 ^a	6.4	-17.5
Aug. 1958	May 1960	+4 ^a	0 ^a	9.9	-
7. HIGH-GRADE RAILROAD BOND YIELD (Macaulay)					
June 1881	Sep. 1883	+27 ^a	+18 ^a	0.7 ^a	-1.7 ^a
July 1886	Oct. 1887	+14	+7	1.2	-1.7
June 1889	Aug. 1891	+14	+13	1.5	-1.9
July 1892	Aug. 1893	+14	+7	2.3	-2.4
Aug. 1895	Aug. 1896	+14	+8	1.7	-1.6
June 1899	Sep. 1903	+24	+12	1.0	-0.7
Feb. 1905	Nov. 1907	+6	+6	1.6	-2.4

(continued)

APPENDIX TABLE 1-A (continued)

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
Feb. 1909	Dec. 1913	+8	+11	0.8	-1.5 ^a
June 1914	Sep. 1915	-6 ^a	-	1.6 ^a	-1.8 ^a
Jan. 1917	Sep. 1918	-	+1 ^a	4.2 ^a	-18.4 ^a
Nov. 1918	May 1920	-4 ^a	+4 ^a	5.4	-4.0
Sep. 1922	Oct. 1923	+14 ^a	-5 ^a	2.6	-1.1
Dec. 1927	Sep. 1929	+1 ^a	+1 ^a	2.4	-2.5 ^a
May 1931	June 1932				
8. NEW ENGLAND MUNICIPAL BOND YIELD (Macaulay)					
Aug. 1882	Nov. 1883	+41 ^a	+20 ^a	0.5 ^a	-0.9 ^a
Aug. 1886	Nov. 1887	+15	+8	2.6	-1.5
Feb. 1890	Aug. 1891	+22	+13	1.8	-0.6
Nov. 1892	Nov. 1893	+18	+10	2.6	-2.4
May 1895	Nov. 1896	+11	+11	1.5	-2.0
Aug. 1899	Feb. 1900	+26	+8	2.2	-1.0
Feb. 1901	Aug. 1903	+2	+11	1.3	-0.4
May 1905	Feb. 1908	+9	+9	2.5	-2.8
May 1909	Aug. 1910	+11	+7	1.8	-0.4
Feb. 1912	Aug. 1913	+1	+7	3.2	-
9. HIGH GRADE MUNICIPAL BOND YIELD (S. & P.)					
Feb. 1901	Mar. 1904	+2	+18	1.1	-1.0
Apr. 1905	Jan. 1908	+8	+8	2.2	-2.7
Mar. 1909	July 1910	+9	+6	1.8	-0.5
June 1911	Sep. 1913	-7	+8	1.3	-2.6 ^a
June 1914	Aug. 1915	-	-	0.9 ^a	-2.1 ^a
Jan. 1917	Apr. 1918	+25 ^a	-4 ^a	4.8 ^a	-2.3 ^a
Dec. 1918	Feb. 1921	-3	+13	3.1	-5.8
Sep. 1922	Dec. 1923	+14	+7	1.5	-1.4
Aug. 1925	Nov. 1925	+13 ^a	-11 ^a	3.2	-0.9
Feb. 1928	Sep. 1929	+3	+1	2.2	-2.6 ^a
May 1931	Feb. 1932	-	-	12.2 ^a	-6.1 ^a
Jan. 1933	May 1933	-2 ^a	-	20.3 ^a	-5.1 ^a
Dec. 1936	Dec. 1937	-	+7 ^a	2.8 ^a	-2.6 ^a
Oct. 1941	Mar. 1942	+40 ^a	-35 ^a	10.1 ^a	-2.0 ^a

(continued)

APPENDIX TABLE 1-A (continued)

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
Feb. 1946	Feb. 1948	+4 ^a	-9 ^a	4.2 ^a	-2.1 ^a
Feb. 1951	July 1953	+16 ^a	0 ^a	3.9 ^a	-4.9 ^a
Aug. 1954	Aug. 1957	0 ^a	+1 ^a	4.3 ^a	-4.3 ^a
June 1958	Jan. 1960	+2 ^a	-4 ^a	3.6 ^a	-
10. YIELDS ON HIGHEST GRADE MUNICIPAL BONDS (Moody's Aaa)					
	May 1937	-	0	-	-
Nov. 1941	Mar. 1942	+41 ^a	-35 ^a	7.6 ^a	-1.7 ^a
Mar. 1946	Apr. 1948	+5 ^a	-7 ^a	3.9 ^a	-1.6 ^a
Feb. 1951	June 1953	+16 ^a	-1	3.8 ^a	-3.8
Aug. 1954	Aug. 1957	0	+1	3.7	-5.2
May 1958	Jan. 1960	+1	-4	3.5	-5.0
Sep. 1960		-5	-	-	-
11. HIGH GRADE CORPORATE AND MUNICIPAL BOND YIELD (S. & P.)					
Apr. 1902	Nov. 1903	+16	+14	1.6	-1.3
Sep. 1905	Nov. 1907	+13	+6	2.8	-2.2
Aug. 1909	Aug. 1910	+14	+7	1.4	-0.8
May 1911	Dec. 1913	-8	+11	0.9	-2.0 ^a
June 1914	Sep. 1915	-	-	0.9 ^a	-1.3 ^a
Jan. 1917	Sep. 1918	+25 ^a	+1 ^a	4.2 ^a	-8.3 ^a
Dec. 1918	July 1920	-3	+6	5.3	-5.0
Sep. 1922	Oct. 1923	+14	+5	1.7	-1.2
Mar. 1928	Dec. 1929	+4	+4	1.9	-2.6 ^a
June 1931	July 1932	-	-	7.8 ^a	-4.2 ^a
Dec. 1936	Apr. 1937	-	-1	4.2 ^a	-1.3 ^a
Nov. 1941	Mar. 1942	+41 ^a	-35 ^a	4.7 ^a	-1.1 ^a
Apr. 1946	Nov. 1948	+6 ^a	0 ^a	1.6 ^a	-1.1 ^a
Feb. 1951	June 1953	+16 ^a	-1	2.9 ^a	-3.8
Aug. 1954	Sep. 1957	0	+2	3.7	-5.6
June 1958	Jan. 1960	+2	-4	4.7	-3.0
Mar. 1961		+1	-	-	-
12. LONG-TERM U.S. BOND YIELD					
Jan. 1919	Aug. 1920	-2	+7	5.9	-7.4
Aug. 1922	Oct. 1923	+13	+5	2.0	-2.8

(continued)

APPENDIX TABLE 1-A (concluded)

Dates of Turning Points		Lead (-) or Lag (+) From Matched Reference Turn (months)		Amplitude of Specific Cycle Phases (change between peak and trough stages in basis points per month)	
Trough	Peak	Trough	Peak	Expansions	Succeeding Contractions
Mar. 1928	Mar. 1929	+4	-5	5.0	-2.4 ^a
June 1931	Jan. 1932	-	-	17.1 ^a	-3.4 ^a
Feb. 1937	Apr. 1937	-	-1	20.0 ^a	-3.0 ^a
June 1939	Sep. 1939	+12 ^a	-	19.8 ^a	-3.5 ^a
Nov. 1941	July 1944	-	-7 ^a	0.3 ^a	-1.8 ^a
Apr. 1946	Sep. 1948	+6 ^a	-2 ^a	1.2 ^a	-1.4 ^a
Jan. 1950	June 1953	+3 ^a	-1	2.0 ^a	-4.0
Aug. 1954	July 1957	0	0	3.2	-4.2
Apr. 1958	Jan. 1960	0	-4	4.9	-2.6
May 1961		+3	-	-	-
13. YIELD ON HIGHEST GRADE CORPORATE BONDS (Moody's Aaa)					
Feb. 1919	June 1920	-1	+5	6.0	-5.1
Sep. 1922	Apr. 1923	+14	-1	3.3	-1.2
Apr. 1928	Sep. 1929	+5	+1	1.8	-1.9 ^a
July 1931	June 1932	-	-	8.8 ^a	-4.1 ^a
Jan. 1937	Apr. 1937	-	-1	9.2 ^a	-1.4 ^a
Dec. 1940	Mar. 1942	+30 ^a	-35 ^a	0.7 ^a	-0.8 ^a
Apr. 1946	Feb. 1948	+6 ^a	-9 ^a	1.7 ^a	-0.9 ^a
June 1950	June 1953	+8 ^a	-1	2.0 ^a	-3.1
Sep. 1954	Aug. 1957	+1	+1	3.3	-4.1
June 1958	Jan. 1960	+2	-4	5.0	-3.8
Sep. 1960		-5	-	-	-
14. YIELD ON LOW GRADE CORPORATE BONDS (Moody's Baa)					
June 1919	June 1921	+3	+17	6.1	-11.5
Sep. 1922	Oct. 1923	+14	+5	4.8	-3.9
Mar. 1928	Sep. 1929	+4	+1	4.2	-2.6 ^a
Sep. 1930	May 1932	-	-	27.2 ^a	-11.9 ^a
Jan. 1937	Apr. 1938	+46 ^a	+11	11.7 ^a	-3.5 ^a
Mar. 1946	Mar. 1948	+5	-8 ^a	2.4 ^a	-1.0 ^a
Dec. 1950	Sep. 1953	+14 ^a	+2	1.8 ^a	-3.0
Oct. 1954	Nov. 1957	+2	+4	4.1	-4.4
July 1958	May 1960	+3	0	3.1	-

SOURCE: See Appendix Table 1-B.

^aIndicates items not used in Tables 1-1 to 1-6. The municipal bond series used in those tables is No. 9 to 1929 and No. 10 thereafter.^bTreated in this study as one expansion with amplitude of 4.1.^cNot available because of break in series.

Part 1. 1879-1919

Reference Cycles (trough to trough)	Call Money	Comm. Paper	Railroad Bonds	New England Muni. Bonds	Municipal Bonds S&P	High Grade Corp. & Muni. Bonds S&P
Mar. 1879-May 1885.						
E ^a	1.2	1.7	-1.7	-1.6		
C ^a	-6.7	-3.5	-0.5	-0.4		
May 1885-Apr. 1888						
E	18.3	6.4	-1.3	-0.4		
C	-22.1	-0.4	0.0	3.3		
Apr. 1888-May 1891						
E	20.0	0.4	-0.3	-1.0		
C	-37.3	2.8	2.0	1.8		
May 1891-June 1894						
E	-1.0	-2.3	-0.7	0.1		
C	-16.2	-12.3	-0.6	0.9		
June 1894-June 1897						
E	11.5	11.6	-0.8	-1.6		
C	-10.0	-9.2	-0.9	-0.3		
June 1897-Dec. 1900						
E	12.6	0.7	-1.0	-1.3		
C	-8.4	0.4	0.5	0.2		
Dec. 1900-Aug. 1904						
E	24.5	5.1	0.6	0.6	0.5	-0.2
C	-29.5	-4.4	0.8	1.0	0.9	0.6

(continued)

APPENDIX TABLE 1-B (continued)

Reference Cycles (trough to trough)	Call Money	Comm. Paper	Railroad Bonds	New England Muni. Bonds	Municipal Bonds S&P	High Grade Corp. & Muni. Bonds S&P
Aug. 1904-June 1908						
E	5.2	6.5	0.7	1.2	1.1	0.6
C	-9.6	-15.0	0.5	1.1	1.3	1.3
June 1908-Jan. 1912						
E	8.6	3.8	-0.2	-0.4	-0.3	-1.1
C	-5.4	-3.0	0.5	0.6	0.5	0.3
Jan. 1912-Dec. 1914						
E	14.8	9.9	0.7		0.8	0.7
Ca	-3.6	-6.2	1.2		0.2	0.6
Dec. 1914-Mar. 1919						
E ^a	6.3	4.5	1.4		0.8	1.5
Ca	-9.9	-10.0	-2.4		0.0	-2.0

Part 2. 1919-61

Section a. Short-term Rates

Reference Cycles (trough to trough)	Call Money	Comm. Paper	Treas. Bills	Bankers' Accept.	Bank Loans	Fed. Res. Discount
Mar. 1919-July 1921						
E	36.0	7.8		10.6	2.9	7.3
C	-17.3	1.1		-0.1	4.0	3.2

(continued)

APPENDIX TABLE I-B (continued)

Reference Cycles (trough to trough)	Call Money	Comm. Paper	Treas. Bills	Bankers' Accept.	Bank Loans	Fed. Res. Discount
July 1921-July 1924						
E	-4.0	-5.2	-4.8	-5.4	-5.3	-6.2
C	-20.1	-10.1	-16.4	-13.7	-4.2	-7.6
July 1924-Nov. 1927						
E	9.4	2.2	5.9	6.1	0.8	2.1
C	-6.8	-2.8	-3.4	-4.8	-2.0	-3.8
Nov. 1927-Mar. 1933						
E	22.8	10.0	9.3	9.0	5.8	9.9
C ^a	-15.5	-8.9	-10.7	-8.9	-2.5	-6.0
Mar. 1933-June 1938						
E ^a	-1.8	-2.5	-1.0	-1.6	-3.5	-3.0
C ^a	0.0	-0.9	-4.6	-0.6	-0.6	-3.8
June 1938-Oct. 1945						
E ^a	0.0	-0.2	0.4	0.0	0.0	0.0
C ^a	0.0	0.0	0.0	0.0	0.0	0.0
Oct. 1945-Oct. 1949						
E ^a	1.7	2.0	2.1	2.0	1.2	1.4
C ^a	0.0	-1.3	-0.6	-1.2	0.1	0.0
Oct. 1949-Aug. 1954						
E ^a	3.6	3.0	2.4	1.8	2.4	1.1
C	-1.9	-6.7	-9.9	-4.8	-1.2	-3.8
Aug. 1954-Apr. 1958						
E	4.3	6.9	7.8	7.2	2.8	4.4
C	-8.7	-21.0	-26.4	-24.0	-1.8	-11.2

(continued)

APPENDIX TABLE I-B (continued)

Reference Cycles (trough to trough)	Call Money	Comm. Paper	Treas. Bills	Bankers' Accept.	Bank Loans	Fed. Res. Discount
	Apr. 1958-Feb. 1961	6.0 -7.8	8.4 -13.9	8.0 -9.8	8.8 -11.6	3.8 -4.1

Part 2. 1919-61 Section b. Long-term Rates						
Reference Cycles (trough to trough)	Corporate Bonds, Moody's		High Grade Corp. & Muni. Bonds		Municipal Bonds	
	U.S. Bonds	Aaa	Baa	S&P	S&P ^a	Moody's Aaa
Mar. 1919-July 1921	3.1 2.0	3.9 1.8	6.4 3.8	3.7 2.2	1.2 3.0	
July 1921-July 1924	-5.0 -3.8	-4.2 -1.5	-6.1 -3.3	-4.3 -1.2	-4.3 -0.4	
July 1924-Nov. 1927	-1.3 -4.2	-1.0 -1.7	-3.5 -3.4	-0.8 -1.3	-0.4 -1.2	
Nov. 1927-Mar. 1933	2.7 -0.9	1.4 -0.3	3.3 6.4	1.8 0.1	1.9 0.9	

(continued)

APPENDIX TABLE 1-B (concluded)

Reference Cycles (through to trough)	U.S. Bonds	Corporate Bonds, Moody's			High Grade Corp. & Muni. Bonds		Municipal Bonds	
		Aaa	Baa	S&P	S&P	Moody's Aaa	S&P	
Mar. 1933-June 1938	-1.5	-2.6	-7.9	-3.1	-3.1	-3.1		
E ^a								
C ^a	-2.5	-0.8	8.5	-1.4	-1.4	-1.9		
June 1938-Oct. 1945								
E ^a	-1.0	-0.7	-3.2	-0.9	-0.9	-1.5		-1.5
C ^a	-0.7	-0.4	-2.8	0.1	0.1	0.2		1.7
Oct. 1945-Oct. 1949								
E ^a	0.2	0.6	0.8	0.8	0.8	1.7		1.8
C ^a	-1.9	-1.9	-1.4	-2.1	-2.1	-1.5		-1.8
Oct. 1949-Aug. 1954								
E ^a	1.8	1.5	1.1	1.6	1.6	1.5		1.9
C	-4.2	-3.3	-2.9	-4.0	-4.0	-4.9		-4.5
Aug. 1954-Apr. 1958								
E	3.2	3.2	3.7	3.6	3.6	4.4		3.8
C	-4.2	-3.7	-0.4	-4.5	-4.5	-4.0		-4.7
Apr. 1958-Feb. 1961								
E	3.7	3.3	2.3	2.9	2.9	1.7		2.2
C	-3.7	-2.4	-2.7	-2.7	-2.7	-5.0		-1.6

NOTE: E denotes expansion; C, contraction.

^a Indicates phases not used in Table 1-5.

SOURCES FOR TABLES 1-A and 1-B

- Call Money Rate: Jan. 1948–Dec. 1961, *Survey of Current Business*; Feb. 1936–Dec. 1947, *Federal Reserve Bulletin*; Jan. 1878–Jan. 1936, Macaulay, *Movements of Interest Rates*.
- Commercial Paper Rate: Feb. 1936–Dec. 1961, computed from weekly data in *Commercial and Financial Chronicle*; Jan. 1878–Jan. 1936, Macaulay, *Movements of Interest Rates*.
- Treasury Bill Rate: *Federal Reserve Bulletin*. (Treasury notes and certificates to 1929, bills thereafter.)
- Bankers' Acceptance Rate: Jan. 1942–Dec. 1961, *Federal Reserve Bulletin*; Aug. 1917–Dec. 1941, *Banking and Monetary Statistics*.
- Bank Loan Rate: IQ 1939–IVQ 1961, *Federal Reserve Bulletin*; Jan. 1928–Dec. 1938, unpublished data supplied by Board of Governors of the Federal Reserve System; Jan. 1919–Dec. 1927, *Banking and Monetary Statistics*.
- Federal Reserve Bank of New York Discount Rate: Jan. 1922–Dec. 1961, Board of Governors of the Federal Reserve System, *Annual Report*, various years, and *Federal Reserve Bulletin*; Nov. 1914–Dec. 1921, simple averages of weighted rates on commercial, agricultural, and livestock paper from FRB, *Discount Rates of the Federal Reserve Banks*, 1914–21.
- High Grade Railroad Bond Yield: Jan. 1878–Dec. 1961, Macaulay, *Movements of Interest Rates*.
- New England Municipal Bond Yield: IQ 1878–IVQ 1914, Macaulay, *Movements of Interest Rates*.
- High Grade Municipal Bond Yield: Jan. 1900–Dec. 1961, Standard & Poor's Corporation, *Security Price Index Record*, various years.
- Yield on Highest Grade Municipal Bonds (Aaa): Moody's Investors Service, *Municipal and Government Manual*.
- High Grade Corporate and Municipal Bond Yield: Jan. 1900–Dec. 1961, simple average of municipal, railroad, public utility, and industrial bond yields from Standard & Poor's Corporation, *Security Price Index Record*.
- Long-Term U.S. Bond Yield: *Federal Reserve Bulletin*.
- Yield on Highest Grade Corporate Bonds (Aaa): Moody's Investors Service, *Industrial Manual*.
- Yield on Low Grade Corporate Bonds (Baa): Moody's Investors Service, *Industrial Manual*.

(continued)

SOURCES FOR TABLES 1-A and 1-B (concluded)

Seasonal Adjustment of Series

Call Money Rate: Seasonally adjusted except 1884, 1893, and June 1931–Dec. 1961.

Commercial Paper Rate: Seasonally adjusted except 1927–1952.

Treasury Bill Rate: Seasonally adjusted except 1931–1947.

Bankers' Acceptance Rate: Seasonally adjusted 1955–1961 only.

Bank Loan Rate: Not adjusted.

Federal Reserve Discount Rate: Not adjusted.

High Grade Railroad Bond Yield: Not adjusted.

New England Municipal Bond Yield: Not adjusted.

High Grade Bond Yield (S&P): Seasonally adjusted except 1900–1921.

Yield on Highest Grade Municipal Bonds (Moody's Aaa): Seasonally adjusted.

High Grade Corporate and Municipal Bond Yield (S&P): Not adjusted.

Long-Term U.S. Bond Yield: Seasonally adjusted 1948–1961 only.

Yield on Highest Grade Corporate Bonds (Moody's Aaa): Seasonally adjusted 1948–1961 only.

Yield on Low Grade Corporate Bonds (Moody's Baa): Seasonally adjusted 1948–1961 only.